Trend Study 10-16-00

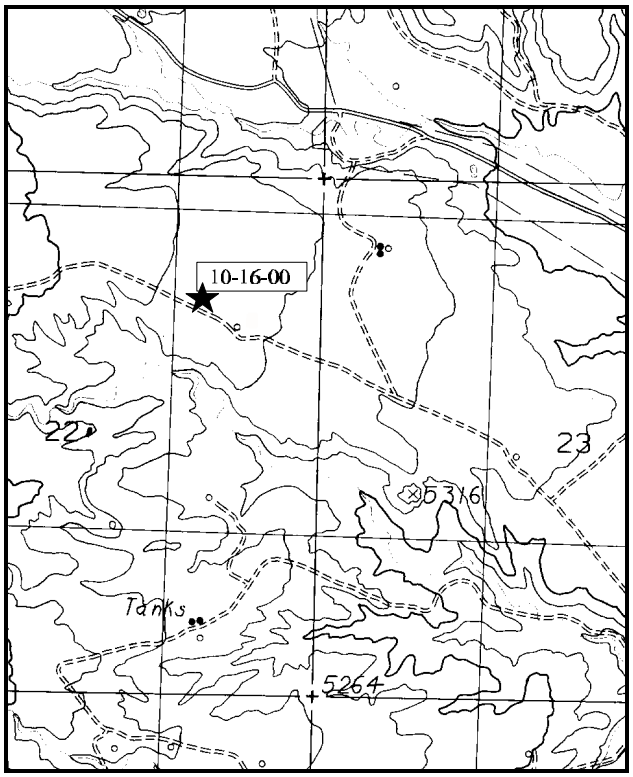
Study site name: West Horse Pasture . Range type: Big Sagebrush-Grass .

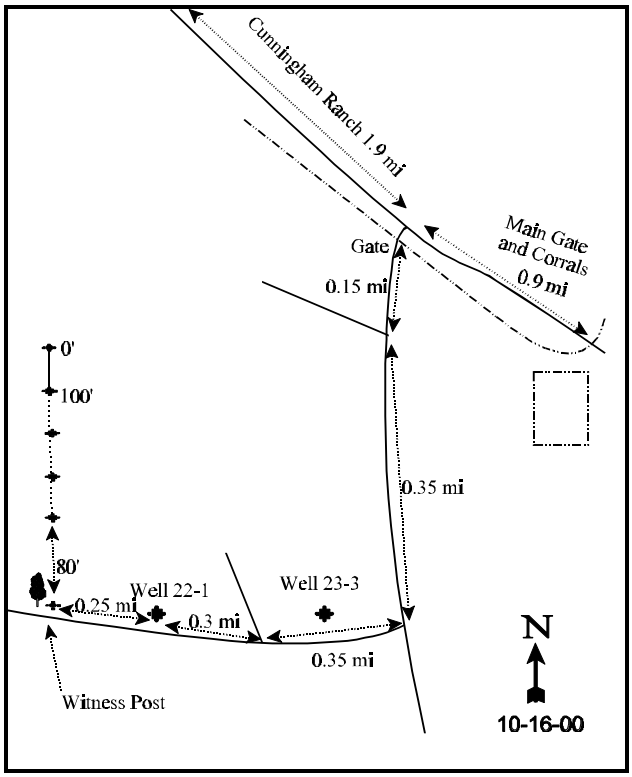
Compass bearing: frequency baseline 165°M .

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (28ft).

LOCATION DESCRIPTION

From the main gate at Cunningham Ranch travel south 1.9 miles to a fork and turn right. Go through a gate (100 yards) and proceed 0.15 miles to a fork at the top of a hill. Stay left and go 0.35 miles to a "T" intersection. Turn right and go 0.35 miles past a well [NP Energy #23-3] to a fork. Stay left and travel northwest 0.3 miles to another well [NP Energy #22-1]. Continue northwest for 0.25 miles to a rebar witness post on the right side of the road next to a small Juniper. The 400-foot stake is 80 feet due north from the witness post. The frequency baseline starts 400 feet north at a rebar tagged with browse tag #7807.





Map Name: Sego Canyon Diagrammatic Sketch

Township 20S , Range 21E , Section 22 UTM. 4323817.811 N, 622881.679 E

DISCUSSION

Trend Study No. 10-16 (16B-3)

The West Horse Pasture transect is located south of Nash Wash and samples critical deer winter range. It is in a large, open Wyoming big sagebrush flat surrounded by junipers and eroded steep cliffs to the north and west. Elevation at the site is 5,300 feet. Not only is this a critical deer winter concentration area, it also supports many other uses including some cattle and sheep grazing, oil and gas exploration and production, mining, and associated human activity. Pellet group transects located in the Horse Pasture area showed an average use of 58 deer days use/acre (143 ddu/ha) between 1981 and 1986 (Jense et al. 1986). From 1986 through 1990, the last time this pellet transect was read, use averaged 39 deer days use/acre (95 ddu/ha) (Jense et al. 1991). A pellet transect read in 2000 along the trend study site baseline estimated 58 deer days use/acre (143 ddu/ha) and 5 elk days use/acre (12 edu/ha). In 1986, four antler drops were found. Cover for deer is provided by a nearby dense stand of mature Utah Juniper.

The transect site is basically flat, draining to the southeast by an ephemeral wash. There is some evidence of surface erosion and an active gully runs between the 300 and 400 foot stake making it necessary to sample line four at the 28 foot mark. Soil loss in the past is evident by a high degree of soil movement from interspaces and subsequent pedestaling around the base of the shrubs. Litter build-up is also evident on mounds underneath shrubs. Shrub interspaces are nearly all bare soil. Cryptogams are mossy-like and are present almost entirely underneath shrub crowns. Soil texture is a sandy clay loam with an average temperature of 64°F at just over 15 inches in depth. Effective rooting depth is estimated at a little beyond 15 inches. A profile stoniness index estimated from penetrometer readings shows a compact layer between 12-16 inches in depth. Very little rock is present in the profile, thus this index is a measure of the depth to a hardpan not actual rock. The soil is slightly alkaline (pH of 7.4) with phosphorus and potassium both lower than the 10 ppm and 70 ppm shown necessary for normal plant growth and development. Vegetative cover was estimated at 36% with a moderate amount of litter cover (46%) in 1995. Both of these categories decreased in value in 2000, while bare ground increased.

The key species is Wyoming big sagebrush which has been utilized heavily for many years on this site. Wyoming big sagebrush currently (‘00) provides 98% of the browse cover and 62% of the total vegetative cover. Average height/crown measurements for mature plants currently are a little more than one foot in height with a little over a two foot crown. In 1986, forage availability was limited due to severe hedging. Heavy use was displayed on 93% of the population in 1986, decreasing to 50% in 1995, and 23% in 2000. Percent decadency has also decreased since 1986, when 55% of the sagebrush were classified as decadent. Currently, 26% of the sagebrush population are decadent. However, 73% of the decadent plants are classified as dying in 2000, an increase from 60% in 1995. This represents about 650 plant/acre that could be lost to die-off in the future. Recruitment from young plants is currently very low at 1%, so the decadent, dying plants should be watched closely. The proportion of the sagebrush population displaying poor vigor has remained nearly the same over all sampling years. The dead to live ratio was 1:6 in both 1995 and 2000. Leader growth ranged from 5-9 inches on sagebrush in 2000.

Broom snakeweed comprised 77% of the browse composition in 1995 having a population estimate of 15,140 plants/acre. This species has since drastically declined to 1,020 plants/acre in 2000. Snakeweed is vulnerable to dry conditions and is apparently decreasing due to the extended drought. Spiny hopsage, which was encountered in 1986, was not sampled in either 1995 or 2000 with the change in sampling design used beginning in mid-1992. Fourwing saltbush is estimated at 20 plants/acre in 2000. There are some scattered young pinyon and juniper trees throughout the flat, but they do not appear to be encroaching into the area. Point-quarter data in 2000 estimate 5 pinyon and 13 juniper trees/acre.

As reported in 1986, the grass composition has been dominated by annual cheatgrass in the past, with perennial grasses being relatively scarce. Cheatgrass was sampled in every quadrat in 1995, but due to the dry conditions in 2000, had a reduced quadrat frequency of 70%. It is still abundant enough to again dominate with normal precipitation patterns. Perennial grasses remain in low abundance in 2000 with the 4 species sampled having a combined nested frequency of only 121. The most numerous perennial grass is currently bottlebrush squirreltail with galleta being next in abundance. Both species have stable nested frequencies in 2000. Sum of nested frequency for all perennial grasses increased in 2000.

Forbs provide less cover than grasses (1.9% in 2000), but are slightly more diverse. Globemallow occurs throughout the area, along with several species of *Astragalus* and low fleabane. The most abundant forb in 1995 was wooly plantain, an annual, which is very low growing and of poor forage value or cover. However, as with virtually all other winter range sites, this species was nearly non-existent in 2000 due to drought. Perennial forbs slightly decreased in sum of nested frequency in 2000.

1986 APPARENT TREND ASSESSMENT

Wyoming big sagebrush on the site is sustaining severe heavy use and data indicates an apparent declining trend in vigor, age structure, and forage production. Ninety-eight percent of the sagebrush population is mature or decadent. The primary management objective should be to promote sagebrush seed production to enhance the opportunity for recruitment, but this is difficult with the high density of competing winter annuals in a very dry summer environment. Plant vigor needs to improve in order for seed production to occur. A combination of management practices could take place for this to happen. Grazing pressure on sagebrush must be greatly reduced. A thinning project designed to open up the stand could help reduce intraspecific competition and open up space for seedling establishment. Key browse species should be seeded in conjunction with the thinning treatment.

1995 TREND ASSESSMENT

Although the Wyoming big sagebrush is not as heavily hedged as in the past (93% vs 50%) and percent decadency in the population has decreased (55% vs 27%), 98% of the population still remains classified as mature or decadent. The broom snakeweed density, judging from its composition, appears to be relatively stable, although it is shifting to a more mature age structure. This leads to a stable browse trend. As mentioned in 1986, management objectives should be to promote sagebrush seed production. Concurrently, the herbaceous understory would benefit if the Wyoming big sagebrush population were thinned, but more importantly there should be fewer winter annuals for the herbaceous species and sagebrush seedlings to compete with. Wyoming big sagebrush now contributes over 12% of the vegetative cover. With this high of a cover value from Wyoming big sagebrush, the herbaceous understory production is reduced and anything more than an annual herbaceous understory should not be expected. The increase in sum of nested frequency for galleta and bottlebrush, which are good to fair forage in the spring, and the increase in sum of nested frequency for perennial forbs, indicates a slightly upward herbaceous understory trend. Although this trend is slightly upward, this is still a poor composition and is nonetheless dominated by annual species. An active gully is located in the center of the study site, but shows some signs of healing. Elsewhere on the site, there is not much evidence of erosion, mostly due to the dense cheatgrass and Wyoming big sagebrush cover. Soil trend for this site is stable for now and the gully should be monitored in the future for further activity.

TREND ASSESSMENT
soil - stable (3)
browse - stable, but over mature population of Wyoming big sagebrush (3)
herbaceous understory - slightly upward but poor composition (4)

2000 TREND ASSESSMENT

Trend for soil is slightly down due to a large increase in bare ground and decreases in vegetation and litter cover. As a result, the ratio of protective ground cover to bare soil decreased in 2000 and is low at just over 2:1. Interspaces between shrubs show past signs of soil loss and with the decrease in annual species, these are virtually bare making them susceptible to erosion. Trend for browse is stable, but the key species Wyoming big sagebrush, remains in a less than ideal condition. The population of Wyoming big sagebrush has remained at similar levels in percent decadency and the proportion of the population in poor vigor. One negative factor is that the decadent plants classified as dying increased from 60% in 1995 to 73% in 2000. Young recruitment remains low at 1% which could translate into a decreasing population in the future if the decadent, dying plants die-off. Heavy use has decreased again in 2000 to 23% of the population, down from 50% in 1995. Trend for the herbaceous understory is stable as sum of nested frequency for perennial species slightly increased in 2000.

TREND ASSESSMENT
soil - slightly down (2)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 10 , Study no: 16

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'95	'00	'86	'95	'00	'95	'00
G	Bromus tectorum (a)	-	$_{b}$374	$_{a}$196	-	100	70	12.08	1.44
G	Hilaria jamesii	$_{a}$2	$_{b}$50	$_{b}$51	2	19	19	1.25	3.73
G	Oryzopsis hymenoides	1	3	5	1	1	2	.15	.44
G	Sitanion hystrix	$_{a}$3	$_{b}$42	$_{b}$63	2	23	27	.44	1.58
G	Sporobolus cryptandrus	$_{b}$12	$_{a}$-	$_{ab}$2	5	-	1	-	.03
G	Vulpia octoflora (a)	-	10	-	-	3	-	.01	-
Total for Annual Grasses		0	384	196	0	103	70	12.10	1.44
Total for Perennial Grasses		18	95	121	10	43	49	1.83	5.78
Total for Grasses		18	479	317	10	146	119	13.94	7.22
F	Astragalus convallarius	5	12	7	3	6	4	.17	.21
F	Astragalus moencopensis	1	-	-	1	-	-	-	-
F	Astragalus spp.	$_{a}$3	$_{b}$28	$_{a}$3	2	11	1	.05	.00
F	Castilleja linariaefolia	-	6	3	-	3	1	.16	.00
F	Calochortus nuttallii	-	3	1	-	1	1	.00	.00
F	Descurainia spp. (a)	-	$_{b}$11	$_{a}$-	-	4	-	.02	-
F	Draba spp. (a)	-	1	-	-	1	-	.00	-
F	Erigeron pumilus	1	-	5	1	-	3	-	.04
F	Gilia hutchinifolia (a)	-	$_{b}$8	$_{a}$-	-	4	-	.02	-
F	Holosteum umbellatum (a)	-	$_{b}$21	$_{a}$-	-	13	-	.06	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'86	'95	'00	'86	'95	'00	'95	'00
F	Lappula occidentalis (a)	-	$_{b}$31	$_{a}$-	-	11	-	.05	-
F	Leucelene ericoides	-	1	3	-	1	1	.00	.03
F	Lepidium spp. (a)	-	$_{b}$51	$_{a}$-	-	23	-	.11	-
F	Oenothera spp.	-	5	-	-	2	-	.01	-
F	Phlox longifolia	$_{a}$-	$_{b}$19	$_{b}$21	-	9	9	.04	.04
F	Plantago patagonica (a)	-	$_{b}$129	$_{a}$2	-	50	1	.30	.00
F	Schoencrambe linifolia	-	-	1	-	-	1	-	.00
F	Sphaeralcea coccinea	20	28	43	10	12	16	.16	1.57
F	Unknown forb-perennial	3	-	-	1	-	-	-	-
Total for Annual Forbs		0	252	2	0	106	1	0.58	0.00
Total for Perennial Forbs		33	102	87	18	45	37	0.61	1.92
Total for Forbs		33	354	89	18	151	38	1.19	1.93

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 10 , Study no: 16

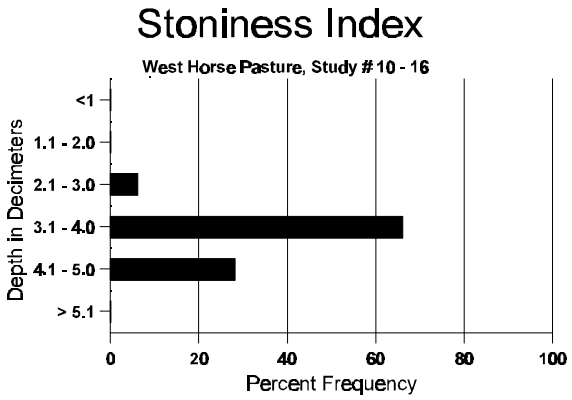
Type	Species	Strip Frequency		Average Cover %	
		'95	'00	'95	'00
B	Artemisia tridentata wyomingensis	84	80	12.32	15.15
B	Atriplex canescens	0	1	-	-
B	Gutierrezia sarothrae	97	34	7.67	.23
B	Opuntia spp.	9	10	.00	.09
Total for Browse		190	125	20.01	15.48

BASIC COVER --
Herd unit 10 , Study no: 16

Cover Type	Nested Frequency		Average Cover %		
	'95	'00	'86	'95	'00
Vegetation	382	277	24.50	36.40	27.21
Rock	10	5	0	.07	.01
Pavement	-	21	0	0	.12
Litter	393	375	48.00	45.56	33.00
Cryptogams	139	93	0	1.89	2.98
Bare Ground	311	348	27.50	29.78	51.00

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 16, Study Name: West Horse Pasture

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
15.39	63.8 (15.51)	7.4	50.0	24.0	26.0	0.7	3.8	57.6	0.5



PELLET GROUP FREQUENCY --
Herd unit 10 , Study no: 16

Type	Quadrat Frequency '95	Quadrat Frequency '00	Pellet Transect: Pellet Groups per Acre '00	Pellet Transect: Days Use per Acre (ha) '00
Rabbit	49	30	235	N/A
Elk	-	3	70	5 (12)
Deer	44	66	757	58 (143)

BROWSE CHARACTERISTICS --
Herd unit 10 , Study no: 16

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
Y	86	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	95	2	3	-	-	-	-	-	-	-	4	-	1	-	100			5
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	86	-	-	11	1	-	6	-	-	-	17	-	1	-	1200	12	14	18
	95	12	59	65	-	4	13	-	-	-	153	-	-	-	3060	17	30	153
	00	12	58	23	8	26	2	-	-	-	126	3	-	-	2580	16	26	129
D	86	-	-	17	-	1	5	-	-	-	15	-	6	2	1533			23
	95	1	26	20	-	1	9	-	-	-	23	-	-	34	1140			57
	00	3	11	12	9	7	3	-	-	-	12	-	-	33	900			45
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	760			38
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	580			29

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'86	05%	93%	21%	+35%
'95	43%	50%	16%	-19%
'00	58%	23%	19%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'86	2799	Dec:		55%
	'95	4300			27%
	'00	3500			26%

Atriplex canescens																		
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	00	-	-	-	-	1	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'86	00%	00%	00%	
'95	00%	00%	00%	
'00	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'86	0	Dec:		-
	'95	0			-
	'00	20			-

Grayia spinosa																		
M	86	-	-	-	-	-	1	-	-	-	1	-	-	-	66	13	17	1
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	20	0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	86	-	-	-	-	-	3	-	-	-	2	-	1	-	200			3
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'86	00%	100%	25%	
'95	00%	00%	00%	
'00	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'86	266	Dec:		75%
	'95	0			0%
	'00	0			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	86	11	-	-	-	-	-	-	-	-	11	-	-	-	733			11
	95	29	-	-	-	-	-	-	-	-	29	-	-	-	580			29
	00	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	86	60	-	-	-	-	-	-	-	-	60	-	-	-	4000			60
	95	262	-	-	2	-	-	-	-	-	264	-	-	-	5280			264
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	86	47	-	-	-	-	-	-	-	-	47	-	-	-	3133	10	7	47
	95	481	-	-	10	-	-	-	-	-	491	-	-	-	9820	12	13	491
	00	41	-	-	-	-	-	-	-	-	41	-	-	-	820	10	11	41
D	86	6	-	-	-	-	-	-	-	-	6	-	-	-	400			6
	95	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
	00	9	-	-	-	-	-	-	-	-	3	-	-	6	180			9
X	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	240			12

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'86	00%	00%	00%	+50%
'95	00%	00%	.13%	-93%
'00	00%	00%	12%	

Total Plants/Acre (excluding Dead & Seedlings)				
'86	7533	Dec:		5%
'95	15140			0%
'00	1020			18%

Opuntia spp.																		
S	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	95	10	-	-	-	-	-	-	-	-	10	-	-	-	200	6	18	10
	00	8	-	-	-	1	-	-	-	-	9	-	-	-	180	5	17	9
D	86	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	3	-	-	-	-	-	-	-	-	1	-	-	2	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'86	00%	00%	00%	
'95	00%	00%	00%	+17%
'00	08%	00%	17%	

Total Plants/Acre (excluding Dead & Seedlings)			
'86	0	Dec:	0%
'95	200		0%
'00	240		25%